

1)

When executing 'pingall' for the first time, the ARP tables for hosts are empty. After the first round, the ARP tables record information about other hosts, allowing investigation of host locations through the ARP tables.

```
ubuntu@mininet:~$ sudo python3 ~/461_mininet/topos/part4.py
Unable to contact the remote controller at 127.0.0.1:6653
mininet> pingall
*** Ping: testing ping reachability
h10 -> X X X X
h20 -> h10 X X X
h30 -> h10 h20 X X
hnotrust1 -> X X X X
serv1 -> h10 h20 h30 X
*** Results: 70% dropped (6/20 received)
mininet> pingall
*** Ping: testing ping reachability
h10 -> h20 h30 X serv1
h20 -> h10 h30 X serv1
h30 -> h10 h20 X serv1
hnotrust1 -> X X X X
serv1 -> h10 h20 h30 X
*** Results: 40% dropped (12/20 received)
mininet>
```

2)

```
mininet> iperf hnotrust1 h10
*** Iperf: testing TCP bandwidth between hnotrust1 and h10
*** Results: ['26.8 Gbits/sec', '26.8 Gbits/sec']
mininet> iperf h10 serv1
*** Iperf: testing TCP bandwidth between h10 and serv1
*** Results: ['29.2 Gbits/sec', '29.2 Gbits/sec']
```

3)

```
mininet> dpctl dump-flows
*** cores21 -----
cookie=0x0, duration=354.396s, table=0, n_packets=13, n_bytes=1274, icmp,nw_src=172.16.10.100 actions=drop
cookie=0x0, duration=354.397s, table=0, n_packets=0, n_bytes=0, ip,nw_src=172.16.10.100,nw_dst=10.0.4.10 actions=drop
cookie=0x0, duration=127.758s, table=0, n_packets=295323, n_bytes=19491366, ip,nw_dst=172.16.10.100 actions=mod_dl_dst:00:00:00:00:00:05,output:"cores21-eth5"
cookie=0x0, duration=117.752s, table=0, n_packets=0, n_bytes=0, ip,nw_dst=10.0.3.30 actions=mod_dl_dst:00:00:00:00:00:03,output:"cores21-eth3"
cookie=0x0, duration=117.747s, table=0, n_packets=0, n_bytes=0, ip,nw_dst=10.0.2.20 actions=mod_dl_dst:00:00:00:00:00:02,output:"cores21-eth2"
cookie=0x0, duration=33.587s, table=0, n_packets=122377, n_bytes=335756982, ip,nw_dst=10.0.1.10 actions=mod_dl_dst:00:00:00:00:00:01,output:"cores21-eth1"
cookie=0x0, duration=7.472s, table=0, n_packets=17878, n_bytes=1022537148, ip,nw_dst=10.0.4.10 actions=mod_dl_dst:00:00:00:00:00:04,output:"cores21-eth4"
*** dcs31 -----
cookie=0x0, duration=354.406s, table=0, n_packets=450519, n_bytes=18309696570, actions=FL00D
*** s1 -----
cookie=0x0, duration=354.414s, table=0, n_packets=1108651, n_bytes=35101906710, actions=FL00D
*** s2 -----
cookie=0x0, duration=354.420s, table=0, n_packets=52, n_bytes=4204, actions=FL00D
*** s3 -----
cookie=0x0, duration=354.423s, table=0, n_packets=51, n_bytes=4106, actions=FL00D
mininet>
```